CLAIMS

1. A tube connector system comprising:

a first sleeve having a first inside surface;

a second sleeve coupled to first sleeve, the second sleeve having a second inside surface that opposes the first inside surface;

a split ring located axially between the first and second inside surfaces, the split ring comprising a first end and a second end wherein a gap is defined between the two ends, and wherein an outer surface portion at the first end is tapered defining an outer ramp and wherein an inner surface portion at the second end is tapered defining an inner ramp; and

a tube surrounded by the ring, wherein when the first sleeve and the second sleeve are brought together, the first and second inside surfaces exert a force radially compressing the split ring causing the inner ramp to ride over the outer ramp.

2. A system as recited in claim 1 wherein the first inside surface is sloped, and wherein the second inside surface is sloped in a direction opposite the first inside surface.

3. A system as recited in claim 2 wherein the split ring comprises an outer surface comprising tapered opposed outer surfaces whereby the split ring has a generally trapezoidal cross-section, and wherein the first sloped inside surface provides a force against a first tapered opposed outer surface and wherein the second sloped inside surface provides a force against the other of said opposed outer surfaces.

4. A system as recited in claim 1 wherein the split ring comprises an outer surface comprising tapered opposed outer surfaces whereby the split ring has a generally trapezoidal cross-section.

5. A system as recited in claim 1 further comprising a second tube within the first tube, wherein when the split ring is radially compressed, the split ring clamps the tube surrounded by the split ring onto to the second tube.

6. A system as recited in claim 1 wherein the inner surface portion of the split ring at the first end is tapered toward the outer surface portion decreasing a thickness of the ring in a direction toward gap.

7. A system as recited in claim 1 wherein the split ring comprises a width wherein the width decreases at the second end in a direction toward the gap.

8. A system as recited in claim 1 wherein the inner ramp comprises two portions angled relative to each other and wherein the outer ramp comprises two portions angled relative to each other and wherein when the split ring is radially compressed the two inner ramp portions ride on the two outer ramp portions.

9. A system as recited in claim 1 wherein the inner ramp is curved in an axial direction and wherein the outer ramp is curved in an axial direction.

10. A system as recited in claim 1 wherein the split ring comprises a body, a first leg extending from a first end of the body and a second leg extending from a second end of the body opposite the body first end, wherein the split ring first end with the outer ramp is formed on a free end of the first leg, and wherein the split ring second end with inner ramp is formed on the body second end, and wherein a second gap is defined between the second leg and the first end of the body, wherein the two gaps are staggered relative to each other.

11. A system as recited in claim 10 wherein a second outer ramp is formed at an outer surface at a free end of the second leg and wherein a second inner ramp is formed on the body end adjacent the first leg and wherein when the split ring is radially compressed the second inner ramp rides on the second outer ramp.

12. A system as recited in claim 11 wherein the side of each leg adjacent the side of the other leg is tapered whereby the width of each leg decreases in a direction away from its corresponding body end.

13. A system as recited in claim 11 wherein the inner surface at the free end of the second leg is tapered decreasing the thickness of the second leg in a direction away from the body second end.

14. A system as recited in claim 13 wherein the inner surface at the free end of the first leg is tapered decreasing the thickness of the first leg in a direction away from the body first end.

15. A system as recited in claim 1 wherein the split ring comprises a body, a leg extending from a first end of the body and a second leg extending from a second end of the body opposite the body first end, wherein the split ring first end with the outer ramp is formed on the first end of the body, and wherein the split ring second end with inner ramp is formed on a free end of the second leg, and wherein a second gap is defined between the first leg and the second end of the body, wherein the two gaps are staggered relative to each other.

16. A system as recited in claim 15 wherein a second outer ramp is formed on the outer surface at the body second end and wherein a second inner ramp is formed at inner surface at the free end of the second leg and wherein when the split ring is radially compressed the second inner ramp rides on the second outer ramp.

17. A system as recited in claim 16 wherein the inner surface at the body second end opposite the outer ramp is tapered toward the outer ramp decreasing the thickness of the body second end in a direction toward the gap adjacent the body second end.

18. A system as recited in claim 17 wherein the inner surface at the body first end opposite the second outer ramp is tapered toward the second outer ramp decreasing the thickness of the body first end in a direction toward the gap adjacent the body first end.

19. A system as recited in claim 15 wherein the side of each leg adjacent the side of the other leg is tapered whereby the width of each leg decreases in a direction away from its corresponding body end.

20. A system as recited in claim 1 wherein a groove is formed on an inner surface of one of said first and second sleeves and wherein the split ring is seated within said groove.

21. A system as recited in claim 1 further comprising a resilient fitting surrounding the tube, wherein the split ring surrounds the resilient fitting, wherein when radially compressed, the split ring clamps on the resilient fitting.

22. A system as recited in claim 21 wherein the resilient fitting is made from silicone.

23. A system as recited in claim 21 further comprising a second tube, wherein the resilient fitting surrounds the first and second tubes.

24. A system as recited in claim 23 wherein the second tube comprises a rib, and wherein the resilient fitting comprises a groove, wherein the rib is fitted in the groove.

25. A system as recited in claim 24 wherein the tube surrounded by the split ring comprises a rib and wherein the resilient fitting comprises another groove wherein the rib of the tube surrounded by the split ring is fitted in said another groove.

26. A system as recited in claim 1 further comprising:

a second split ring located axially between the first and second inside surfaces; and

a spacer located axially between the two split rings, wherein when the first and second sleeves are brought together the first and second inside surfaces and the spacer exert a force radially compressing both split rings.

27. A system as recited in claim 1 wherein one of the sleeves comprises a plurality of grooves on its outer surface accommodating a spanner wrench.

28. A tube connector system comprising:

a first sleeve having a first inside surface;

a second sleeve coupled to the first sleeve, the second sleeve having a second inside surface that opposes the first inside surface;

a first tube;

a second tube;

a resilient fitting surrounding the first and second tubes; and

a split ring surrounding the resilient fitting and located radially inside of the first and second sleeves, and axially between the first and second inside surfaces, wherein when the first sleeve and second sleeve are brought together, the first and second inside surfaces exert a force radially compressing the split ring, and the split ring radially compresses the resilient fitting over at least one of said first and second tubes.

29. A system as recited in claim 28 wherein the first inside surface is sloped, and wherein the second inside surface is sloped in a direction opposite the first inside surface.

30. A system as recited in claim 29 wherein the split ring comprises an outer surface comprising tapered opposed outer surfaces whereby the split ring has a generally trapezoidal cross-section, and wherein the first sloped inside surface provides a force against a first tapered opposed outer surface and wherein the second sloped inside surface provides a force against the other of said opposed outer surfaces.

31. A system as recited in claim 28 wherein the split ring comprises an outer surface comprising tapered opposed outer surfaces whereby the split ring has a generally trapezoidal cross-section.

32. A system as recited in claim 28 wherein the resilient fitting comprises silicone.

33. A system as recited in claim 28 wherein at least one of the tubes comprises at least one rib and wherein the resilient fitting comprises at least one groove, wherein said at least one rib is seated in said at least one groove.

34. A system as recited in claim 28 wherein the split ring radially compresses the resilient fitting against the first tube, wherein the second tube comprises a plurality of spaced apart annular ribs, and wherein the resilient fitting comprises a plurality of grooves, wherein each of said plurality of annular ribs is seated in a separate one of said plurality of grooves.

35. A system as recited in claim 34 wherein the first tube comprises a rib and wherein the resilient fitting comprises another groove, wherein said first tube rib is seated in said another groove.

36. A system as recited in claim 28 wherein each sleeve comprises a lip, wherein the resilient fitting is located between the two lips and wherein the lips axially retain the resilient fitting.

37. A system as recited in claim 28 wherein the split ring comprises two ends, wherein an inner surface portion of the split ring at each end is tapered toward the outer surface of the split ring.

38. A system as recited in claim 28 further comprising:

a second split ring located axially between the first and second inside surfaces and surrounding the resilient fitting; and

a spacer located axially between the two split rings, wherein when the first and second sleeves are brought together the first and second inside surfaces and the spacer exert a force radially compressing both split rings.

39. A system as recited in claim 28 wherein one of the sleeves comprises a plurality of grooves on its outer surface accommodating a spanner wrench.

40. A tube connector system comprising:

a first sleeve having a first inside surface;

a second sleeve coupled to the first sleeve, the second sleeve having a second inside surface that opposes the first inside surface;

a split ring located radially inside of the first and second sleeves, and axially between the first and second inside surfaces, wherein the split ring comprising,

a body having a first end and a second end,

a first leg extending from the body first end, and

a second leg extending from the body second end, wherein a first gap is defined between the first leg and the body second end, wherein a second gap is defined between the second leg and the body first end, wherein the two gaps are staggered, and wherein the side of each leg adjacent the side of the other leg is tapered whereby the width of each leg decreases in a direction away from its corresponding body end; and

a tube surrounded by the split ring, wherein when the first sleeve and second sleeve are brought together, the first and second inside surfaces exert a force radially compressing the split ring for clamping on the tube.

41. A system as recited in claim 40 wherein the first inside surface is sloped, and wherein the second inside surface is sloped in a direction opposite the first inside surface.

42. A system as recited in claim 41 wherein the split ring comprises an outer surface comprising tapered opposed outer surfaces whereby the split ring has a generally trapezoidal cross-section, and wherein the first sloped inside surface provides a force against a first tapered opposed outer surface and wherein the second sloped inside surface provides a force against the other of said opposed outer surfaces.

43. A system as recited in claim 40 wherein the split ring comprises an outer surface comprising tapered opposed outer surfaces whereby the split ring has a generally trapezoidal cross-section.

44. A system as recited in claim 40 wherein the inner surface at an end of each leg is tapered toward the upper surface in a direction toward a free end of the leg.

45. A system as recited in claim 40 further comprising:

a second split ring located axially between the first and second inside surfaces; and

a spacer located axially between the two split rings, wherein when the first and second sleeves are brought together the first and second inside surfaces and the spacer exert a force radially compressing both split rings.

46. A system as recited in claim 40 wherein one of the sleeves comprises a plurality of grooves on its outer surface accommodating a spanner wrench.

47. A tube connector system comprising:

a first sleeve having a first inside surface;

a second sleeve coupled to the first sleeve, the second sleeve having a second inside surface that opposes the first inside surface;

a groove formed on the second sleeve

a split ring seated in the groove and located axially between the first and second inside surfaces; and

a tube surrounded by the split ring,

wherein when the first sleeve and second sleeve are brought together, the first and second inside surfaces exert a force radially compressing the split ring, and the split clamps on the tube.

48. A system as recited in claim 47 wherein the first inside surface is sloped, and wherein the second inside surface is sloped in a direction opposite the first inside surface.

49. A system as recited in claim 48 wherein the split ring comprises an outer surface comprising tapered opposed outer surfaces whereby the split ring has a generally trapezoidal cross-section, and wherein the first sloped inside surface provides a force against a first tapered opposed outer surface and wherein the second sloped inside surface provides a force against the other of said opposed outer surfaces.

50. A system as recited in claim 47 wherein the split ring comprises an outer surface comprising tapered opposed outer surfaces whereby the split ring has a generally trapezoidal cross-section.

51. A system as recited in claim 47 wherein the first sleeve is a male sleeve and wherein the second sleeve is a female sleeve, wherein the first sleeve is received within the second sleeve.

52. A system as recited in claim 51 wherein the first sleeve is threaded to the second sleeve.

53. A system as recited in claim 51 wherein the split ring comprises two ends, wherein an inner surface portion of the split ring at each end is tapered toward the outer surface of the split ring.

54. A system as recited in claim 47 further comprising:

a second split ring located within the groove and axially between the first and second inside surfaces; and

a spacer located axially between the two split rings, wherein when the first and second sleeves are brought together the first and second inside surfaces and the spacer exert a force radially compressing both split rings.

55. A system as recited in claim 47 wherein one of the sleeves comprises a plurality of grooves on its outer surface accommodating a spanner wrench.

56. A tube connector system comprising:

a first sleeve having a first inside surface;

a second sleeve coupled to the first sleeve, the second sleeve having a second inside surface that opposes the first inside surface;

a first split ring located axially between the first and second inside surfaces;

a second split ring located axially between the first and second inside surfaces;

a spacer located axially between the first and second the split rings; and

a tube surrounded by the two split rings, wherein when the first sleeve and second sleeve are brought together, the first and second inside surfaces and the spacer exert a force radially compressing both split rings.

57. A system as recited in claim 52 wherein the first an d second inside surfaces are sloped, wherein each split ring each comprise first and second tapered opposed outer surfaces, wherein the spacer comprises first and second opposed tapered surfaces, wherein the first sloped inside surface mates with the first tapered outer surface of the first split ring, wherein the fist taped surface of the spacer mates with the second tapered outer surface of the first split ring, wherein the second spacer tapered surface mates with the first tapered outer surface of the second split ring and wherein the second sloped inside surface mates with the second tapered outer surface of the second split ring.

58. A system as recited in claim 56 wherein one of the sleeves comprises a plurality of grooves on its outer surface accommodating a spanner wrench.